Docket No.: F2108.0041
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Shigeru Nakamura

Application No.: 10/568,984 Confirmation No.: 8872

Filed: August 2, 2006 Art Unit: 2874

For: ALL-OPTICAL SWITCH Examiner: H. Q. Tran

PRE-APPEAL BRIEF REQUEST FOR REVIEW

MS AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

INTRODUCTORY COMMENTS

Applicant respectfully requests a review of the legal and factual bases for the rejections in the above-identified patent application. Pursuant to the guidelines set forth in the Official Gazette Notice of July 12, 2005, for the Pre-Appeal Brief Conference Program, as extended by Official Gazette Notice of February 7, 2006, favorable reconsideration of the subject application is respectfully requested.

Claims 1-5 are pending in the application have been twice rejected, most recently in a Final Office Action mailed December 26, 2008 (the "Office Action"). A copy of these claims are annexed to this Brief for the reviewer's convenience. In particular, claims 1-5 have been rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 6,337,762 to Ueno (Ueno). Applicant respectfully submits that rejection of these claims is improper for the reasons set forth in detail below.

Ueno Fails to Disclose the Claimed Delay Unit

The Office Action cites Ueno, Fig. 12, element [39] as disclosing "a delay unit for causing said second light signal to be inputted to said second nonlinear optical element after said first light signal is inputted to said first nonlinear optical element," as required by independent claim 1. Ueno labels the device identified by reference numeral [39] with the designation: "Feedback Control System." Ueno describes element 39 of Fig. 12 as follows: "[t]he attenuation amount of the optical attenuator 42 is controlled by the feedback control system 39." Ueno, col. 11, ll. 55-56. Feedback control system 39 is not a delay unit, rather, it is a control system that controls the operation of attenuation unit 42 by monitoring the spectrum of a supervisory light passing through the switch. For this reason alone, Ueno cannot anticipate claim 1.

An Advisory Action issued June 22, 2009 makes further arguments. The Advisory Action points to Ueno's first embodiment and argues that Ueno teaches that a phase change in non-linear optical elements can lead to a delay. The Advisory Action inappropriately argues that the delay produced within the non-linear optical device 11 is the claimed delay unit. But claim 1 requires a delay unit that delays light reaching the second non-linear optical element, not within the second non-linear optical element.

The Advisory Action further points to Ueno's second embodiment, depicted on Fig. 12, and argues that optical attenuator 42, controlled by feedback control system 39, leads to a phase change, and therefore a delay, in waveguides 10 and 11. Applicant respectfully disagrees that the optical attenuator 42 is the claimed delay unit and disagrees that it is appropriate to cite the phase change produced by the non-linear optical element (waveguide 11) as the delay unit. Ueno discloses that an amount of attenuation "is set so that the spectrum of transmission supervisory light reaching the spectrum component analyzer becomes a single-peak spectrum, thereby the amount of non-linear phase shift of the semiconductor waveguide 11 is set to an optimum value." Ueno, col. 11, ll. 62-67. Thus, Ueno teaches that, by controlling the intensity of light reaching non-linear waveguide 11, the non-linear optical device 11 produces a "phase difference at the switch-off time zone [that] uniformly becomes π (FIG. 15B)." Ueno, col. 12, ll. 39-42. Like feedback control unit 39, attenuator 42 is not a delay unit that delays the light *arriving* at the second non-linear optical element, as required by claim 1.

The Advisory Action also points to Fig. 17 and argues that the "input pulse coming from the circulator '52' . . . will change the phase values [in] waveguide 10 and 11 resulting in a delay." Again, the Advisory Action inappropriately cites the phase change produced by the non-linear optical elements, and does not point to any disclosure in Ueno representing the claimed delay unit.

Ueno fails to disclose delay time shorter than relaxation time

Furthermore, Ueno fails to disclose a delay element that provides a delay time that is "shorter than a relaxation time of the nonlinear refractive index change in said first and second nonlinear optical elements," which is also required by claim 1. Ueno discloses that when wavelength conversion of an (RZ) return-to-zero light signal is conducted, the delay time is required to be adjusted according to the bit rate of the RZ light signal. In contrast, Applicant's Specification discloses that, when wavelength conversion of an non-return-to-zero (NRZ) light signal is conducted, the delay time is not required to be adjusted according to the bit rate of the NRZ light signal. *See Specification*, page 24, lines 23 to 25, where notably, Applicant's Specification states that "there is no need to change the time difference T according to the operating bit rate."

Ueno's Disclosure is Directed to RZ Signals, and Would Not Properly Process NRZ Signals

Moreover, while Ueno's disclosure relates to a RZ light signal, the present invention relates to a NRZ light signal. Ueno neither discloses nor suggests "a first input port to which a non-return-to-zero light signal is inputted" as Applicant has argued in the response to a First Office Action. Ueno discloses a configuration that outputs the wavelength-converted RZ light signal when the RZ light signal is inputted. However, if a NRZ light signal were inputted to a device disclosed by Ueno, a NRZ light signal would not be outputted. This is because in a state which the nonlinear waveguide in both arms of a Mach-Zehnder optical circuit is continuously-excited, changes in the refractive index in the both arms cancel each other out, and thus, the NRZ light signal to be inputted is "1" while the wavelength-converted NRZ light signal is "0." This issue is described in "Problem which the Invention Should Solve" of Applicant's Specification.

As described above, the configuration which relates to the RZ light signal and the configuration which relates to the NRZ light signal are different. In other words, an identical configuration cannot correspond to both the RZ light signal and NRZ light signal. Thus, the present invention and the invention disclosed by Ueno are different in terms of the configuration.

Ueno Fails to Disclose the Claimed Attenuation Unit

In addition, claim 1 of the present invention recites "an attenuation unit for attenuating said second light signal inputted to said second nonlinear optical element below said first light signal inputted to said first nonlinear optical element." In the claimed invention, the amount of nonlinear phase shift induced in the second nonlinear optical element when it is excited by the second light signal is not the same as the amount of nonlinear phase shift in the first nonlinear optical element at that particular point in time.

In contrast, Ueno's disclosure relates to "an adjusting device which adjusts the optical intensity of said first input light to give adjusted input light" and "a control device . . . controls said adjusting device according to said output supervisory light to adjust the optical intensity of said first input light" so that it is the same at a particular point in time. *See* Ueno, claim 8. The cited attenuator 42 of the second embodiment, depicted in Fig. 12, optimally adjusts the intensity of the second light signal so that it is precisely equal to the intensity of the first light signal. *See* Ueno, Figs. 15A and B. The amount of nonlinear phase shift induced when the second nonlinear optical element is excited is the same as the amount of nonlinear phase shift in the first nonlinear optical element at the given time, and an output optical intensity of the wavelength converter becomes zero at that point in time. The RZ light signal is formed by this apparatus and a feedback control device is utilized to improve the extinction ratio. Thus, the attenuation unit disclosed by Ueno does not provide disclosure of the claimed attenuation unit for alternating NRZ light signals, and attenuator 42 does not meet the limitations of the claimed attenuator.

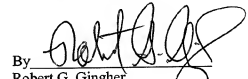
For at least the reasons expressed above, a *prima facie* case of anticipation has not been made, because Ueno does not anticipate the recited limitations of independent claim 1. In the absence of any disclosure or suggestion of these claimed features of the invention, claim 1 is believed to be in condition for allowance.

Claims 2-5 depend from independent claim 1 and incorporate by reference all the limitations found therein and are therefore allowable for the same reasons as those discussed above. These claims include further limitations which, in combination with the limitations of claim 1, are neither disclosed nor suggested in the art of record, and are therefore further allowable.

In view of the above arguments addressing limitations of the independent claims not taught or suggested by the art of record, where such limitations are incorporated by reference in the remaining dependent claims, Applicant believes the pending application is in condition for allowance.

Dated: June 26, 2009

Respectfully submitted,

By 

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APPENDIX A

LISTING OF THE CLAIMS

1. (Previously presented) An all-optical switch characterized in comprising:

a first input port to which a non-return-to-zero light signal is inputted;

a second input port to which a carrier light is inputted;

first and second light paths;

a division unit for dividing light inputted to said first and second input ports into said first and second light paths;

a first nonlinear optical element provided to said first light path, into which a first light signal among the light signals divided by said division unit and one of the carrier lights among the carrier lights divided by said division unit are inputted, for causing a refractive index to change in nonlinear fashion according to said first light signal, and shifting the phase of said one carrier light in a nonlinear fashion;

a second nonlinear optical element provided to said second light path, into which a second light signal among the light signals divided by said division unit and an other carrier light among the carrier lights divided by said division unit are inputted, for causing a refractive index to change in nonlinear fashion according to said second light signal, and shifting the phase of said other carrier light in a nonlinear fashion;

an attenuation unit for attenuating said second light signal inputted to said second nonlinear optical element below said first light signal inputted to said first nonlinear optical element;

a delay unit for causing said second light signal to be inputted to said second nonlinear optical element after said first light signal is inputted to said first nonlinear optical element; and

a synthesizer for synthesizing light that has passed through said first and second light paths;

wherein a time by which the inputting of said second light signal is delayed by said delay unit is shorter than a relaxation time of the nonlinear refractive index change in said first and second nonlinear optical elements.

2. (Original) The all-optical switch according to claim 1, characterized in that said first and second input ports are arranged so that the propagation direction of said light signal is in the opposite direction from the propagation direction of said carrier light.

3. (Previously presented) The all-optical switch according to claim 1, characterized in that said carrier light is unmodulated, continuous light.

4. (Previously presented) The all-optical switch according to claim 1, characterized in that said carrier light is a clock light pulse that is synchronized with said non-return-to-zero light signal.

5. (Previously presented) The all-optical switch according to claim 1, characterized in that said delay unit is formed by making the length of the light path from said division unit to said second nonlinear optical element in said second light path longer than the length of the light path from said division unit to said first nonlinear optical element in said first light path.